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In-situ sol-gel synthesis of titanium dioxide-graphene oxide heterostructures for water purification technologies

Naknikham, Usuma; Boffa, Vittorio; Yue, Yuanzheng

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Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Naknikham, U., Boffa, V., & Yue, Y. (2017). *In-situ sol-gel synthesis of titanium dioxide-graphene oxide heterostructures for water purification technologies*. Abstract from 12th Pacific Rim Conference on Ceramic and Glass Technology including Glass & Optical Materials Division Meeting 2017, Waikoloa, Hawaii, United States.

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CONTROL ID: 2614785

CURRENT SYMPOSIUM: Symposium 27: Ceramics for Enabling Environmental Protection: Clean Air and Water
CERAMICS FOR ENERGY AND ENVIRONMENT

CURRENT SESSION: Novel materials and processes enabling new products for environmental protection

PRESENTATION TYPE: Poster

TITLE: In-situ sol-gel synthesis of titanium dioxide-graphene oxide heterostructures for water purification technologies

AUTHORS (LAST NAME, FIRST NAME): Naknikham, Usuma¹; Boffa, Vittorio¹; Yue, Yuanzheng¹

INSTITUTIONS (ALL):

1. Chemistry, Bioscience and Engineering, Inorganic Chemistry, Aalborg, Denmark.

PROFESSIONAL/ACADEMIC STATUS:

Usuma Naknikham : Graduate Student

Vittorio Boffa : Faculty

Yuanzheng Yue : Faculty

Presenter Acknowledgment: I have read and acknowledge the above paragraph

ABSTRACT BODY:

Abstract Body: Titanium dioxide-graphene oxide (TiO₂-GO) heterostructures presents superior photocatalytic properties, due to their efficient use of the solar light and to their ability to adsorb water pollutants . However, the synthesis of such heterostructures often involves tedious experimental steps, the reaction mechanisms of which are not well understood yet. In this context, we developed and optimized a synthetic path for the preparation of TiO₂-GO heterostructures with large interphase and strong interaction between GO (or reduced GO) and TiO₂. TiO₂ nanoparticles were synthesized by in-situ sol-gel reaction. Synthetic conditions (pH and temperature) were optimized to enhance the interface interaction between TiO₂ and GO. The new materials were characterized by XRD, SEM and TEM analysis, besides the study of Ti-O-C interface bonding was carried out by XPS. In addition, the impact of the GO loading (0.01, 0.5, 1, 2, 5, and 10 wt.%) on the photocatalytic performances of TiO₂ was studied with model pollutants. Lastly, band gap energy and UV-VIS diffuse reflection were conducted to observe the degree of TiO₂-GO composites which works under the visible light.

KEYWORDS: TiO₂-GO heterostructures , photocatalytic property, interface bonding.